NATIONAL INTELLIGENCE ESTIMATE

Soviet Space Programs

NIE 11-3-73
20 December 1973

No. 249

THIS ESTIMATE IS SUBMITTED BY THE DIRECTOR OF CENTRAL INTELLIGENCE AND CONCURRED IN BY THE UNITED STATES INTELLIGENCE BOARD.

The following intelligence organizations participated in the preparation of the estimate:

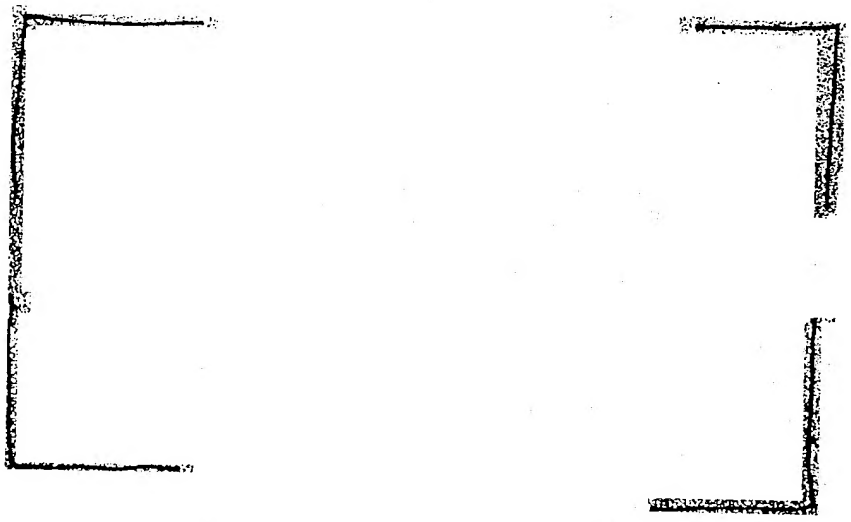
The Central Intelligence Agency, the intelligence organizations of the Departments of State and Defense, and the NSA.

Concurring:

The Deputy Director of Central Intelligence
The Director of Intelligence and Research, Department of State
The Director, Defense Intelligence Agency
The Director, National Security Agency
The Assistant General Manager for National Security, Atomic Energy Commission

Abstaining

The Assistant Director, Federal Bureau of Investigation, and the Special Assistant to the Secretary of the Treasury, Department of the Treasury, the subject being outside of their jurisdiction.



~~SECRET~~

NIE 11-1-73

SOVIET SPACE PROGRAMS

~~SECRET~~

CONTENTS

SOVIET SPACE PROGRAMS

PRECIS

The USSR will continue to undertake space programs for a variety of reasons:

- — Supporting strategic military objectives by using existing military space support systems, and by developing new applications.
- — Enhancing the image of Soviet scientific and technical prowess by undertaking prestige space endeavors, such as manned, lunar, planetary, and scientific programs.
- — On a lower priority, increasing the use of space for missions with more immediate economic benefits, such as communications relay and earth resources surveys.

Currently, some three-fourths of Soviet activity in space (as measured by number of launches) is in support of strategic-military objectives. The strategic-military space programs have been generally successful, while some of the civilian prestige programs have run into major problems. Well over 90 percent of the military missions have been successful over the past 6 years, but only some 75 percent of the prestige missions have accomplished their objectives. Moreover, the

effort devoted to the strategic-military programs has been growing relative to civilian programs.

Military space programs, which continues to rely heavily on proven military hardware, are extensive in scope. The major Soviet space effort in support of strategic objectives is the collection of intelligence data by photographic and other satellite reconnaissance systems. A second very important area is communications satellites. Other programs include navigation, geodetic, and meteorological systems. The USSR has developed a satellite interceptor and a fractional orbital bombardment system.

Performance of military space systems will improve as later generation spacecraft become operational. These are likely to include tactical as well as strategic applications. New systems for warning, intelligence collection, and communications are being developed.

By contrast, Soviet manned space and other prestige programs requiring advanced technology have run into disastrous problems, and the USSR has lost its coveted image of predominance in space. In the prestige programs, problems have cropped up throughout the cycle of development and in many technical areas. These problems do not result from inattention or inadequate effort. Rather, they seem to be a consequence of inadequate design, fabrication, instrumentation, and quality control, and of attempting to cover up, rather than to address and solve, fundamental problems. These are failures of technology in the first instance, but they are more fundamentally failures of management inherent in the Soviet system.

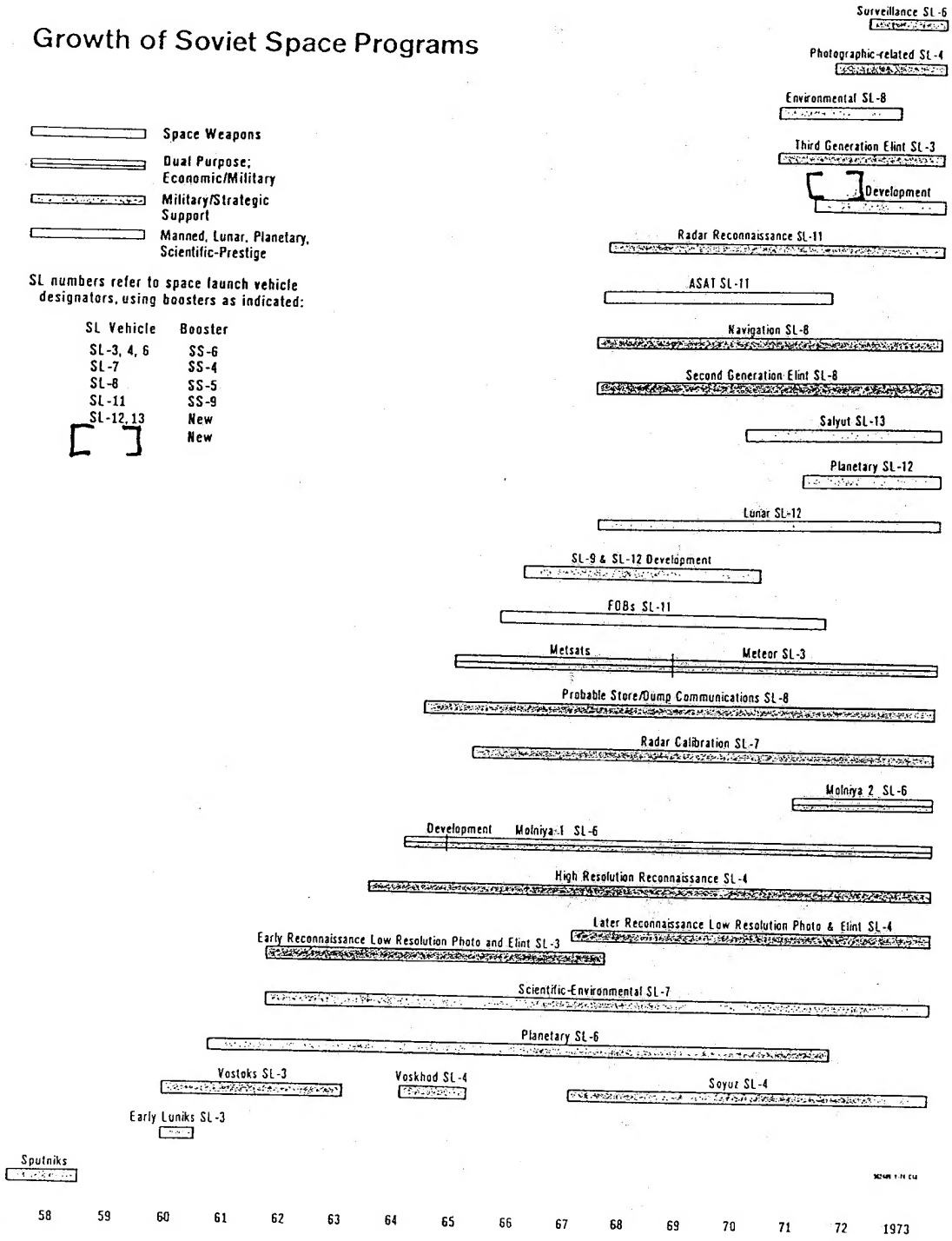
In this situation, the Soviets have entered into more extensive cooperation with the West to enhance the image of Soviet prowess in space and to gain technological know-how. Soviet participation in the Apollo-Soyuz Test Project (ASTP), which has been entered into also as one element of the broader policy of détente, will be handicapped by secrecy and bureaucratic lethargy, but we believe that, as long as détente is attractive, the Soviets will find ways to keep ASTP alive. The USSR will continue and perhaps expand somewhat its program of politically-rewarding but relatively uncomplicated cooperative ventures in space with countries other than the US.

We expect more manned Soyuz flights, and a continuation of Salyut flights, in near earth orbit over the next few years. We believe such advanced space endeavors as a manned lunar landing and a large manned space station continue to be Soviet objectives, but progress toward them will be slowed by the weaknesses in the USSR's technical and managerial base, and they are unlikely to be achieved until the 1980s. For the remainder of the 1970s, the Soviets will also conduct various unmanned missions to the moon, Mars, Venus, and perhaps Mercury. They could attempt a Jupiter or Jupiter/Saturn fly-by as early as about 1975, and a more ambitious series of Jupiter missions in the early 1980s.

After a period of rapid growth in the 1960s, Soviet funding of space programs is estimated to have leveled off in the 1970s, and will probably continue at approximately present levels for the next few years. As other elements of the Soviet economy make increasing claims on high-quality technical resources, space programs—particularly the prestige programs—may not enjoy their past favored position in competing for these resources. But Soviet space programs almost certainly will not suffer significant long-term cuts in funding.

Figure 1

Growth of Soviet Space Programs



THE ESTIMATE

I. GENERAL RATIONALE AND EMPHASIS OF SOVIET SPACE PROGRAMS

1. In the early years, Soviet space programs used hardware already available and relied entirely on boosters developed as ballistic missiles. Missions were predominantly those—such as the manned, lunar, and planetary flights—that could be and were publicized. There were also scientific programs for exploration of space near the earth. (Figure 1, opposite, portrays the growth of the major Soviet space programs as represented by their flight history. Current Soviet space launch (SL) vehicles are shown in Figure 2 on page 10). This approach provided a series of space flights that simultaneously made headlines, had a high probability of success, and held costs down. The clear intent, for the most part, was to enhance an image of Soviet scientific, technical, and military prowess, and the earlier missions were a key element in the growth of Soviet prestige.

2. In the mid-1960s, the Soviets broadened their earlier approach by launching, for practical military and economic uses, satellites that were much more widely based in technology and objectives. Some of these programs, such as those for communications and weather reporting, were not amenable to extensive publicity. Some could not be publicized at all—such as those for photographic and ELINT reconnaissance, radar calibration, intercepting satellites, and providing navigational support. These satellites continued to use military boosters that had been well-proven; well over 90 percent of the missions have been successful in the past six years. Since the mid-1960s the majority of Soviet space launches have been for satellites with military- and intelligence-related missions, with the result that today some three-fourths of Soviet activity in space (as measured by number of launches) supports the USSR's strategic military objectives. These programs are currently being supplemented by newer programs now in the development cycle—such as a radar reconnaissance satellite and what may be a high altitude surveillance spacecraft.

3. In order to move beyond their earlier publicized successes in space, the Soviets had in the late 1960s to develop larger and more complicated space boosters and spacecraft. This new hardware had serious performance problems, and Soviet prestige programs consequently did not move forward as expected. Only some 75 percent of the prestige missions have achieved their objectives in the past six years. The US was at the same time succeeding in its advanced programs—especially Apollo—with the result that the USSR lost its early image of predominance in space.

4. In addition to its strategic military and prestige aspects, the Soviet space effort has had economic objectives, but so far these appear to have a much lower priority. The programs that provide economic benefits do so for both military and civilian users.

5. Soviet expenditures for space programs reflect these priorities and years of growth. Total Soviet annual spending for space is estimated to have increased from the equivalent of about $800 million in 1960 to the equivalent of about $8 billion in 1971.[1] The growth of the military-strategic share from about 15 percent of the total in 1960 to about 40 percent today reflects the growing importance of strategic programs.[2] For the most part, strategic-military systems have used existing hardware and technology in standardized payloads and boosters and thus cost less per launch than the publicized systems. Many of the publicized systems—such as Salyut and Lunokhod—have used hardware and technology which required heavy investment in research and development.[3]

6. Annual Soviet space launches have leveled off at close to 1971 levels of some 90 launches a year, and estimated annual expenditures have remained close to the equivalent of about $8 billion. By far the largest annual outlays since 1971—about $3 billion—have been for man-related programs (civil and military) and the associated boosters. Salyut-class space stations have absorbed the greatest portion of this total. The next largest outlays were for existing photographic and ELINT reconnaissance programs, which absorb about one-third as much, followed in order by planetary, lunar, and earth applications programs.

II. PROGRAMS IN SUPPORT OF STRATEGIC OBJECTIVES

7. The major Soviet space effort devoted to military and strategic objectives, involving some 40 launches a year, is the collection of intelligence data from other nations and areas of the world through the use of reconnaissance satellites. A second, very important area is the continuing development and maintenance of reliable communications satellites. Additional major strategic roles are navigation support for Soviet ships and the collection of worldwide weather data.

Reconnaissance

8. The Soviets have several types of satellites for the collection of photographic and

[1] The estimated Soviet space costs given here include the costs of hardware, launch operations, construction of facilities, tracking and data acquisition, administration, and research and development for both military and civilian programs. These costs represent the cost of producing similar systems in the US. Generalized cost models were used, which attribute US developmental practices and techniques to the Soviet systems. Thus there are major uncertainties in the absolute costs of the overall Soviet space program, and these values should be used with caution. We have far more confidence in the overall trends.

Revised estimates of the pace and timing of Soviet space programs, necessitated by the stretchout of some major elements of the Soviet effort, have resulted in a somewhat lower estimate of annual outlays than in the past. The stretchout has been only partially balanced by Soviet development of some programs (geodetic, radar reconnaissance, and photographic-related) not previously estimated and by higher launch rates (two Salyut-class satellites and four Mars probes in 1973). The estimates appear higher, however, because they are now expressed in 1972 dollars, representing an inflation of some 20 percent over 1968 dollars used previously.

[2] There is much overlapping and sharing of hardware, facilities, and outputs between military and civilian components of the Soviet space programs. All applications programs—for civilian or military users—use military boosters, bases, and personnel. The allocation of resources to military or civilian programs in this Estimate is based on whether a similar program in the US would be funded under the Department of Defense or NASA, except in the case of Molniya and Meteor satellites, whose costs have been divided ⅔ military, ⅓ civilian. The allocation does not attempt to estimate just how much is actually funded by the Soviet Ministry of Defense.

[3] Several recent prestige efforts have been quite expensive, compared to strategic support activities. The Salyut, Mars probes, and [redacted] are estimated to have cost on the order of 10 times as much per launch as a photoreconnaissance satellite.

electronic data, and they are working on a new radar satellite system. The *photographic reconnaissance systems* are used to keep track of foreign military forces and installations, as well as for close monitoring of crisis situations such as the Pakistan/Indian conflict in 1971 and the latest Mideast war, during which the Soviets launched 6 photoreconnaissance satellites in 17 days. Since the satellites have relatively short life times, about 30 are launched each year. Such frequent launches provide flexibility, because the mission targeting can be optimized for specific targets, and a satellite can be recovered after a short period without giving up coverage. But the relatively small amount of film carried in each mission limits coverage and the rapidity with which previously unknown developments can be identified. Moreover, the resolution of the sensors—even on the high-resolution system—may limit the usefulness of the imagery for detailed technical intelligence. Soviet photographic reconnaissance satellites are expected to improve in resolution, and perhaps in film recovery flexibility, in order to meet requirements to cover Communist China, crisis situations, and—above all—US weapons developments and compliance in strategic arms agreements.

9. Soviet *ELINT satellites* are more clearly understood than in previous years. Second generation ELINT satellites now monitor predominantly ocean and coastal areas. Third generation ELINT satellites—still in developmental testing—are now used mostly over land areas, but are expected to be used mostly over ocean areas in the future. These satellites appear to be able to contribute directly to detecting and, in the case of the most modern system, locating foreign naval ships. Moreover, they monitor various early warning radars. Major anticipated advances include expanded coverage and refinement of the technical data that they collect on radar targets so as to improve identification and technical analysis.

10. The Soviets in the past few years have been testing a *radar reconnaissance satellite.* The spacecraft uses a side-looking radar that can detect large surface ships, such as aircraft carriers. This system has a potential for providing targeting data to combatants at sea. The combination of data from such a system with data from other sources, such as ELINT satellite data, would be highly useful in targeting antiship missiles. The flight tests of the radar satellite to date more than likely represent developmental work, as opposed to qualification of an operational system.

But the Soviets probably will attempt to develop a version of this satellite that could be used operationally to obtain information on small ocean areas, and may be able to do so by the 1975-1977 period. If the Soviets choose to develop a more capable radar reconnaissance satellite or a radar surveillance satellite for broad continuing ocean coverage, it probably could not appear until later.

Surveillance [4]

11. The characteristics of a satellite launched in late 1972 and of another launched early in November, 1973, suggest the Soviets may now be working on a high altitude, surveillance-type satellite. The most logical choice of mission—based on our perception of Soviet needs and the probability that the Soviets have conducted missile launch detection experiments—would be a system for

[4] A surveillance satellite provides broad, wide-ranging, and continuous or frequent coverage of a portion of the earth. A reconnaissance satellite, on the other hand, provides limited coverage of a small area of the earth, and may not do so frequently.

detection of missile launches. However, until we better understand this program, we are not able to gauge its true mission, its significance, or its time schedule. In any case, we believe that the Soviets will develop and introduce early warning satellites. Other areas of possible Soviet advances include ocean surveillance (with greater coverage and longer mission times than the radar reconnaissance system now under development), detection of nuclear detonations, and SIGINT surveillance. The latter two types of satellites would work best in high altitude orbits.

Communications

12. The Soviets have in the past few years greatly expanded, in space and on the ground, their use of satellite systems for the relay of communications. The use of the *Molniya 1* high altitude system has expanded with the development of a Moscow-Washington hot line[redacted]

[redacted]

13. Each Molniya 1 satellite has a limited relay capability, and a large deployment of satellites is required to fulfill the above functions in addition to growing civil communications requirements. We believe that *Molniya 2* satellites, now in the early operational stages, will eventually take over the bulk of Soviet civil and military satellite communications and provide orders of magnitude increases in satellite relay capacity within the USSR. Tactical applications might appear by the 1975-1977 period. When the geostationary satellite *Statsionar* becomes operational, perhaps by about 1975, it will furnish another major level of communications support.

14. The Soviets now have also deployed extensively small satellites that probably store communications until they are "dumped" to a specific consumer.

Weapons Support

15. Other types of Soviet satellites support deployed weapons systems.

—[redacted]

[redacted]

— The Soviets have relied, at least in part, on the mapping capabilities of their satellite reconnaissance cameras for *geodetic* data for targeting missiles. Over the last few years, the Soviets have deployed optical sites at various locations in the USSR, and at research sites in Antarctica. One purpose of these sites is accurate tracking of a series of satellites specifically developed for geodetic purposes.

— Special satellites are also used as targets, probably for the *calibration*[redacted]

[redacted]

— *Weather satellites*—named in the Meteor series—collect meteorological information, presumably from all over the world. The information was probably first received by military installations, but the Soviet Hydrometeorological Service now receives weather data for civil use.

Weapons

16. The USSR has developed a satellite interceptor and a fractional orbital bombardment system (the SS-9 Mod-3).

* * * * * *

17. The number of launches per year in support of strategic goals has leveled off in the 1970s, after a rapid growth in the 1960s. While these systems will continue to enjoy the same priorities as the military weapons systems, the general level of launch activity is not expected to pick up in the 1970s. In fact, the prospects are that, as satellites grow in capability (more time in orbit and more film time per reconnaissance mission, for example), the number of military space launches may decline while the number of active satellites in orbit will grow. New military applications and systems will continue to be developed, however, in the areas of reconnaissance, surveillance, communications, and weapons support. These are likely to include tactical applications. The total effort in terms of resources expended is likely to remain about the same.

III. ECONOMIC APPLICATIONS

18. Although Soviet activities in space have had relatively little influence on the Soviet economy, the potential economic benefits have grown. It is probable that current economic applications will continue and that new ones will be introduced. The future extent and value of these applications of space technology, however, are not clear. The Soviets are likely to utilize satellites even more extensively as a means for improving communications, predicting weather, and studying earth resources. The Soviets may try to utilize economic applications—especially earth resources studies—in their relations with less developed nations.

19. The potentially most rewarding area is the use of satellites to conduct studies of the earth's surface and its natural resources. This has already been done to a certain extent in the manned program, and may have been done as well—to a very limited degree—with a special series of photographic-related satellites. Such studies have application for, among other objectives, locating new mineral deposits, understanding earthquake phenomena, and identifying fishing areas and the effects of pollution. They also can be used to survey forests, arable land, crops, water resources, and to upgrade estimates of national resources. The Soviets probably have also used photoreconnaissance satellites to provide information of the breakup of ice in the northern sea routes.

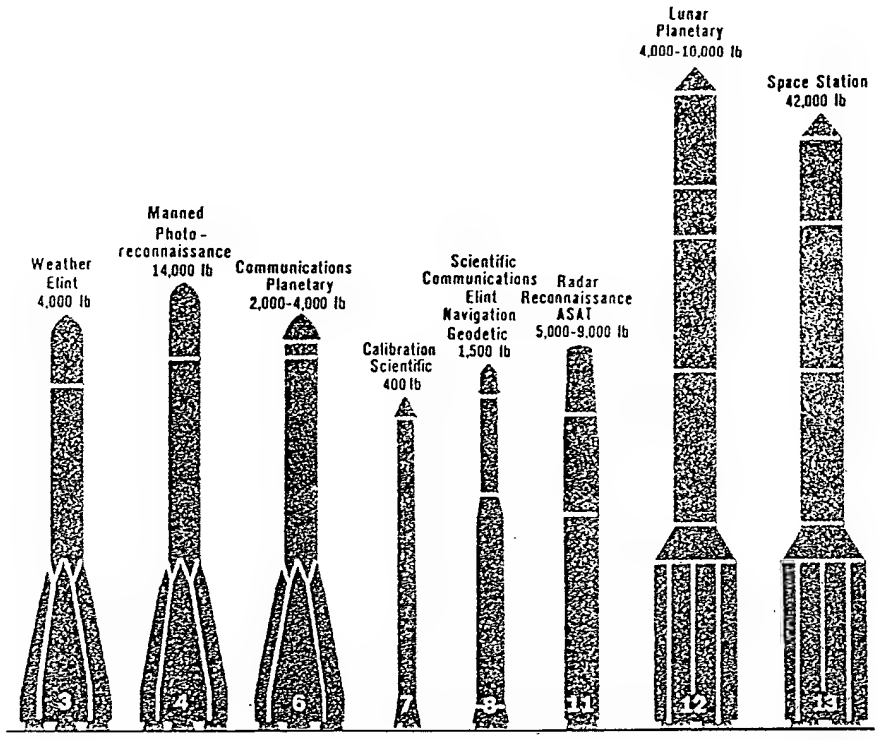
20. Satellites used in support of strategic goals also play an important economic role.

— Weather observations based on satellite data are more comprehensive and timely, and cover greater geographical areas, than ground facilities. Satellite data are especially useful to agriculture and shipping as well as in warning of severe storms. The Soviets clearly are following the West's lead in this area and will continue to use weather information from non-Soviet sources as well as their own.

— Communications satellites provide a much less expensive means of relaying long distance communications in all forms, and are particularly attractive within the USSR, where the distances between settled areas—especially east of the Urals—are great. About 80 percent of the country is north of the US-Canadian border, and in many areas severe winter weather precludes the use of most ground-based relay systems. The Soviets have been using relay satellites for years[redacted]We expect the volume of data to increase in the next 10 years,

Figure 2

Current Family of Soviet Space Launch Vehicles*



*Launch Vehicles No Longer Used Are: SL-1, SL-2, SL-5, SL-9, and SL-10

Note: Missions and weights cited are typical.

especially as technical cooperation with other nations grows.

21. There has been scant evidence of spin-off of Soviet space technology into the civilian economy. There is growing emphasis on the use of space—as well as space technology—in the economy, but the one example touted so far (some medical applications) is not significant. The Soviets clearly are trying, however. We expect to see some examples of the utilization of space technology in the civilian economy over the next 10 years, but the secrecy surrounding the space program will limit this process more than in the West.

IV. PRESTIGE PROGRAMS

22. Although the strategic, economic, and scientific applications programs contribute to the image of the USSR as a modern and technologically advanced nation, this reputation rests largely on the highly publicized successes in their early manned space, lunar, and planetary programs. Soviet accomplishments in these areas, however, relative to the US, have been steadily less impressive since the mid-1960s. At the same time the US successes in space—especially the Apollo and Skylab programs—have enhanced the US image, a very poor Soviet record has contributed to the decline of theirs. Soviet leadership in space is no longer the accepted public judgment, as it once was, even in the USSR.

23. The USSR thus is in a difficult position. Given the earlier successes, it cannot afford to allow the US to appear to become predominant in all areas of space endeavor, yet it cannot now compete with the US because of severe technical and managerial limitations.

24. The Soviets have attempted to maintain an aura of success about their space program by exaggerating the success of their ventures and by playing down or ignoring their failures. Even internally, they have shown a tendency to try to leapfrog failures in order to push on. Only in the most obvious of cases, such as the cosmonauts' deaths in Soyuz 11, have they admitted difficulties. In order to enhance this image of success, the Soviets use the Cosmos name to cover most aspects of their space programs. Where the mission is not obvious, the spacecraft is given a number, and the announcement provides little or no information as to its mission. This system of nomenclature has been used to cover not only military-related launchings, but also failures as well. It has created an image of an active, successful program, when in fact there are many problems. Even in programs which are open, and where it would seem desirable, or at least harmless, for the Soviets to release technical information, they have been historically reluctant to do so. This reluctance stems partly from the Soviet practice of security and compartmentation, and partly from a desire to hide their limitations.

Problems to be Overcome

25. The problems plaguing Soviet manned space, lunar, and planetary programs during the past few years have appeared largely in just those programs which were trying to refurbish the Soviet image and to advance the frontiers by using new space launch vehicles and spacecraft. (See Figure 2, opposite.) The problems crop up throughout the cycle of program development—in planning, design, materials production, test, and evaluation—and in general program management.

26. That these problem areas are so pervasive is, in general, a result of the fact that Soviet technology lags the West, in most of the areas related to space activities, by some five years. In particular, the problems stem from the manner in which Soviet space programs evolved. Early Soviet successes, using large cryogenic boosters, which were built to carry unminiaturized nuclear weapons,

did not force the early development of improved boosters with high energy upper stages and of the lightweight, small size technology that the US developed. These advances in propulsion, electronics, and materials, which characterize US programs, now furnish the basis for the US lead in prestige programs.

27. Limitations at each stage in the development cycle, and in many technologies, compound the problems of the Soviet prestige space programs, but design limitations are certainly fundamental. These are best exemplified by problems in Soviet spacecraft. From the beginning their spacecraft designs have been oversimplified, and they have failed to develop separate redundant systems to provide alternatives for inflight emergencies. Soviet spacecraft are crudely constructed, have limited instrumentation, and, for manned vehicles, reflect little concern for crew comfort. Even after many years, the Soviets still use outmoded technology, and their techniques and materials have become inadequate for the complex tasks now being attempted.

28. But the designers have to use the technology and materials available. In this context, flight hardware must be differentiated from laboratory equipment. Soviet scientists and engineers have a high degree of competence in developing advanced technology items in the laboratory, but production items frequently lack the quality of original single-piece hardware. Lack of quality control in manufacturing crops up specifically in Soviet development of those technologies which have enabled the US to push ahead in high energy propulsion and in miniaturized electronics. Shortcomings in the latter are felt across a number of vital areas—not only in hardware to control boosters and spacecraft, but in particular in the sensors, instrumentation, communications, and data processing that allow the causes of failures to be pinpointed.

29. The Soviets' relative lack of refined instrumentation to determine the cause of failures—together with inadequate quality control—are the prime reasons that complex new flight test programs have had repeated failures before successes are achieved. The SL-12/13 space booster, used for the Salyut launches and the Mars probes, went through a series of failures before it became reliable. It appears that ground testing has tended to be more of a go/no-go affair with potential failures remaining undiscovered until actual flight. This results in an "onion peeling" effect, in which the solution of one problem only reveals another. The Soviets are now attempting to correct this situation with improved telemetry systems and procurement of more simulation equipment, but they are late in doing so.

30. In addition to the problems of design, fabrication, and test instrumentation, problems show up in the management and control of the spaceflight itself. These are most apparent in manned missions—probably because of their scope and complexity and their requirement for quick resolution of problems.

31. Limitations are also found far back up the program management ladder from spaceflight operations. It is very difficult in the USSR to introduce new types of production or radically new materials into existing facilities, but this had to be done if the Soviet space industry were to expand beyond the few original dedicated facilities with the top choice of engineers and workers. Compounding the problem, supporting industries adequate to provide the special equipment, parts, and advanced technical know-how are in relatively short supply in the USSR. Soviet problems can perhaps be laid, in part, to their failure to take advantage, in the prestige space programs, of some of the advanced manage-

ment concepts and techniques used in the West.

32. More fundamentally, they have failed to make the Soviet space program work as well as it should because they had to work within the Soviet system. For example, Soviet management is often done by committee. Members are from various parts of the Soviet power structure, they appear to each other as approximate equals, and there is no apparent mechanism for the enforcement of solutions once a problem is recognized and resolved.

33. The Soviets are certainly aware of the damage that failure to solve these problems does to their national image. There is evidence that extensive basic research supports the space effort. Manned space, lunar, and planetary programs receive the best support from the technical institutes, and they have been generously funded. The failures thus have not come as a result of inattention or inadequate effort. Rather they seem to have been a consequence of attempting early on to continue to achieve success with minimum effort, and to cover up, rather than adequately to address and solve, fundamental problems. These failures are failures, in the first place, of technology, but more fundamentally they are failures of management inherent in the Soviet system.

Cooperation in Space Programs

34. The problems the Soviets have encountered in their manned space programs have caused them to be increasingly more open in their approach to space efforts that do not have a strategic impact and to look more favorably on cooperation with other countries. With the example of the US before them, the Soviets have released pictures, models, and actual hardware at an increasing rate. This trend has been a function of increasing numbers of cooperative programs, of the need felt by Soviet scientists to demonstrate their competence, and of the growing sophistication of the average person regarding space matters.

35. The first US-USSR agreement on cooperation in space was for exchange of weather data and was arrived at in 1962, but the US received little Soviet data until the launch of the Meteor 1 satellite in 1969. Actual exchange of information has also lagged in other areas covered by agreements, such as in a long overdue joint review of space biology and medicine, and in erratic cooperation in the exploration and use of outer space. The thaw in East-West relations over the past few years has, however, reduced the political barriers to cooperation.

36. The US-USSR agreement on cooperation in space, signed at the Moscow Summit in May 1972, to conduct a test docking mission in earth orbit in July 1975, marked a new level of potential cooperation. As the Apollo-Soyuz Test Project (ASTP) is now conceived, a US-designed docking mechanism will be installed on a docking module which will also serve as an airlock and transfer corridor between the US and Soviet spacecraft. During the docking period, which may last as long as two days, the crews will visit each others' spacecraft and perform a few experiments.

37. Such cooperative activities in space must appear attractive to Moscow for a variety of reasons:

— As a part of the broader policy of détente, the ASTP and other cooperative agreements are indications of easing East-West tension.

— The ASTP project contributes to the public image of Soviet technological equality with the US by suggesting that, despite the absence of manned lunar expeditions, the USSR is on a scientific and technical par with the US in its space programs.

— Space programs in general are a subject of world-wide popular interest, and cooperative activities promote a favorable image of the USSR in general.

— The US is the source from which the Soviets can learn a great deal in terms of scientific, technological, and managerial know-how, so that they can attempt to close the gap between the space programs of the two countries. The USSR also lags behind other Western countries in most of these areas.

38. Nevertheless, the Soviet decision to engage in the project probably was contested, and approved only when it could be demonstrated that it held more advantages for the USSR. There were certainly strong arguments in the Kremlin against such an undertaking, as well as the usual extensive bureaucratic problems of resolving policy questions among divergent scientific, industrial, military, and political interests. Cooperative activities must appear unattractive for at least some of the following reasons:

— The USSR remains sensitive about disclosing most of the details of its space programs, which remain classified in the USSR, largely because of the close linkages between the military and civilian space efforts.

— They are aware of their technical shortcomings, reluctant to expose them, and reluctant to risk public failure in such undertakings.

— If the venture is a success, credit will have to be shared with political enemies.

39. These bureaucratic problems have not been disposed of; they have merely been pushed into the background. Moreover, the technical and managerial problems experienced by the Soviets in their space programs in general, and in the Salyut mission in particular, will not be solved easily. All these problems will crop up to present practical obstacles in achieving agreement, and in meeting schedules and goals. But we believe ASTP stems from détente, and as long as détente is attractive, the Soviets will find ways to keep ASTP alive. The specific problems will have to be worked through, and the Soviet leadership will certainly see to it that ASTP gets the necessary priorities in terms of technical and managerial talent.

40. Moreover, even though there still are problems with the Soyuz spacecraft, Soyuz technology is no longer at the forefront of Soviet space research. It is the Salyut and related programs which are most in trouble in the USSR, not Soyuz. The Soyuz program is now over six years old, and Soyuz 12 retested some of the old approaches. In addition, the ASTP mission plan and hardware development have been steadily changed to take technical and managerial pressure off the Soviets. The most important new hardware development in ASTP is the docking module, and this is the responsibility of the US. The Soviets thus are taking minimum risk to achieve maximum gain.

41. If Soviet-US cooperation goes beyond ASTP to more advanced projects, the Soviets will be pressed closer to the limits of their technical and managerial talents. It is likely, however, that the Soviets will learn from the US as they go, keep the projects within their capabilities (or alter them as necessary), and continue to benefit as much as possible from US know-how and world publicity while giving a minimum in return. Until they can undertake major new projects successfully on their own—and their technology to do this is now at least five years behind that of the US—the Soviets need a US cooperation program to help bolster their technology and prestige, and will continue to promote such cooperation.

12. In addition to its dealings with the US, the USSR has in the past sought, and continues to seek, space cooperation with other noncommunists states:

— The extensive Franco-Soviet program, including placement of a French laser reflector on the moon, is one such effort. Again, political as well as scientific considerations were important.

— The USSR has been similarly engaged in cultivating scientific and political ties with India. A forthcoming Soviet project to launch an Indian scientific satellite in 1974 will serve to further that end.

— The Soviets also are beginning cooperative programs with the European Space Research Organization (ESRO), West Germany, and Sweden. These efforts are still small but are likely to grow. It is quite possible that cooperative efforts with still more nations will begin in the future.

43. The USSR's cooperation in space has also included ventures with the Warsaw Pact nations, beginning in the late 1960s. These started as technically trivial efforts at public relations, but recently have grown and have embraced other Socialist nations as well. The overall effort now is to the point that specific satellites—named in the Intercosmos series—are launched in cooperative projects. Eleven of these launches have occurred. This effort, too, has political, as well as technical and public relations aspects, although there is less potential Soviet gain in cooperation with Pact nations than with the West. Nonetheless, we expect the effort to continue for the foreseeable future at about the current level.

44. The outlook for cooperation in general is for a continuation of the trend that has seen the Soviets become increasingly open with respect to space activities, including the handling of their own space program and their dealings with other nations. Cooperative efforts with countries other than the US, as well as with the US, will continue and expand to some degree in the future. We do not believe, however, that the USSR will try to undertake truly complex space programs with countries other than the US. The cost alone of major space efforts limits the participants, and the US is the only nation with a major space program of potential use to the USSR.

Prospects for Prestige Programs

45. As has been noted above, the Soviets are hindered by the fact that the USSR has not created the necessary technical and managerial base to keep up with the US in the prestige programs. These limitations will further delay schedules for manned space stations, manned lunar landings, and planetary exploration.

Manned and Related Space Stations

46. The disastrous Salyut 1/Soyuz 11 mission, which ended in the death of three cosmonauts, and the three successive failures of other Salyut type spacecraft have set the Salyut program back at least two years. Investigations carried on Salyut 1 included earth resources surveys, astronomical studies, medical and biological studies, atmospheric and meteorological investigations, and other scientific experiments. These were designed to test the feasibility of the station for a variety of uses. Salyut 2 was different from Salyut 1, had [redacted] a larger area of solar arrays. While the Soviets could develop and operate separate civil and military space stations, as might be suggested by Salyut 1 and 2, it seems equally likely that the competition for space resources might eventually result in an amalgamation of missions.

47. Although a successful ASTP will shore up the Soviet space image to some extent, it

will not in fact demonstrate Soviet technical parity with the US in manned space flight. The Soyuz is a remnant from the early- to mid-1960s Soviet technology. While it is being modified as well as possible, it is primitive compared to Apollo. And although the Soviets touted Salyut as the doorway to manned orbital spaceflight in the 1970s, it is technically far behind the US Skylab, and has yet to fly a wholly successful mission. We expect to see continuing Salyut missions, to resolve Soviet problems in manned space stations, over the next couple of years. We also expect to see more manned Soyuz space flights with specific, limited objectives that can be used to demonstrate an on-going Soviet capability before ASTP. Thereafter Salyut will probably be the focus of Soviet manned space flight until about 1977, and perhaps longer.

48. A persistent theme in Soviet public statements and literature has been that intermediate (Salyut) size orbital stations will be used to build a larger station by linking modules in orbit. But before this can be done, there are severe technical problems to be resolved which require additional developmental advances and substantial overall improvements in systems reliability. With optimum speed and success in resolving these problems, a manned station of Salyut-like linked modules, maintaining successive 6-9 man crews for several months at a time, could be in operation by 1980. Soviet performance to date does not, however, engender confidence that these problems will be resolved soon enough to meet that date.

Space Shuttle

49. Some Soviet space officials have expressed interest in a US-type reusable space shuttle and have indicated a desire for such a program. But the USSR is many years from achieving such a shuttle—so far in fact that we cannot predict when a reusable shuttle of the US type might appear. The electronics, materials, and system test problems are beyond Soviet capabilities now. Any attempts to build a reusable shuttle would be plagued by problems. Between now and the 1980s, the Soviets will continue to use ferry spacecraft and existing launch vehicles. But the Soviets also may introduce spacecraft and/or booster components that are reusable after a fashion, call the combination a "space shuttle", and claim another space first. A desire to reduce the cost per launch and the Soviet commitment to a manned space station program may make development of a truly reusable shuttle attractive to the Soviets during the 1980s.

Unmanned Lunar Exploration

50. The Soviet unmanned lunar program—almost completely preempted by the Apollo program prior to its termination—is expected to continue at its current low level for several years. The success of the two lunar rovers, Lunokhods 1 and 2, might prompt the Soviets to try more ambitious unmanned lunar ventures. These flights—such as a dual mission of a rover and a sample return payload—might occur in the mid-1970s using two SL-12s. Such lunar missions as the Soviets attempt will allow more complex missions and advances in scientific exploration, as well as opportunities to demonstrate technical competence. The low level effort will grow as the Soviets make progress toward their own manned lunar landing.

Manned Lunar Landing

51. It still appears that the Soviets will make an effort to land men on the moon and return them. But the failures, long slippage, and apparent low priority connected with the program make it unlikely that a specific schedule exists. The timing of a manned lunar mission hinges on the success of [ ] If the [ ] launches over the next few years are

successful, and the Soviets attach a high priority to the program, a manned lunar mission could still take place by the end of the 1970s. But any major failures of [ ] will almost certainly push the mission into the 1980s. The present priorities appear to emphasize the development of manned space stations.

Planetary Exploration

52. The impact of the planetary and lunar efforts in the early space program were enormous. They intensified the feelings that the Soviets were the dominant space power in the late 1950s and early 1960s. As the US program developed, however, Soviet deep space feats had relatively less impact on the world. After a long series of failures and partial failures, the Soviets, during 1972, finally achieved a landing on Venus with a spacecraft which transmitted multiple measurements that could be read and interpreted.

53. New spacecraft were launched toward Mars in July and August 1973 by the SL-12 launch vehicle. The higher energy requirements of the 1973 Mars window compounded the weight problems, and the Soviets decided to split the missions and use separate landers and orbiters; thus four vehicles were sent on their way to Mars, rather than two as in 1971. The 1975 launch window to Mars involves still greater launch energy requirements and approach velocities than those in 1973. Because of this, the Soviets may forego the 1975 window, but will probably use the 1977 window, which will have less stringent energy requirements than the 1975 window.

54. The SL-6 and Venus spacecraft can be used throughout the 1970s to support a variety of Venus missions. It is more likely, however, that the Soviets will use the SL-12. The Soviets have discussed Venus upper atmosphere probes using balloons. These might be within the present Soviet capability and might occur during the launch windows over the balance of the decade. A public relations type attempt at a Venus swingby with flyby or impact on Mercury, could be accomplished next year. A significant scientific venture to obtain scientific data probably will not occur before the 1976 launch window.

55. The Soviets have shown some interest in exploration of the outer planets. But a useful payload requires a more capable launch vehicle, such as [ ] or the SL-12 with high energy upper stages. The [ ] has not been flown successfully and an upgraded SL-12 has yet to be launched. Attempts at a Jupiter or Jupiter/Saturn flyby using one or more high energy stages on the SL-12 could start about 1975, assuming early and successful testing of such stages. The Soviets might be ready to attempt a series of Jupiter missions in the early 1980s using [ ]

V. FUTURE PRIORITIES

56. We expect the Soviets to continue their prestige-related programs at about their present rate. These programs will continue to be constrained by Soviet technical and managerial limitations, but the Soviets will continue to try to work around these problem areas, borrow from the West, and—if necessary—try to leapfrog them. We also expect the Soviets will continue to develop new applications and programs to support military-strategic objectives. We do not expect Soviet limitations to be as serious in this area because they use technology closer to the state of the art. Further, we believe that the Soviets will introduce satellites that will be much more useful in the economic area, so that by the late 1970s and early 1980s, this element of the program will become much larger than it is today. The prospect is thus for a continued high effort in the military programs, with improved performance; a continuation of present efforts in the prestige space pro-

grams (although probably with greater success); and some shifting of resources to programs with more economic return.

57. As program objectives grow, there will be an increased need for advanced technology, such as high energy propulsion and nuclear power sources, for nearly all mission areas. Generally, this advanced technology will be used first in support of military-strategic applications. Significant results of this technology will include extension of spacecraft life and development of more multisensor—and multi-function—satellites. The improved performance inherent in these changes may lead to a reduction in the annual number of Soviet space launches.

58. There is little doubt that there has been and will continue to be economic pressure to reduce the resources put into some aspects of Soviet space programs. We have evidence that there is some disillusionment with the Soviet manned space program. And complaints have been heard that space spectaculars deprived the military of much-needed resources. The new Five Year Plan in 1970 called for greater emphasis on space applications—communications, navigation, and earth resources programs—which used proven hardware and had a demonstrable economic return. But perhaps even more importantly, the new plan relied heavily on the application throughout the Soviet economy of technological improvements in productivity to keep the economy growing. And this required a much greater input to the economy of the sophisticated equipment and human talent that heretofore were being devoured by the space program. A natural consequence of these developments was that funds for some programs were not as easily available as in the past and some programs were stretched out. We believe, however, that economic constraints have not seriously affected the scope and timing of the space programs; these have been and will be much more subject to technical and managerial constraints.

59. Based on currently observable programs and the assumption that there are programs in the early stages of development that are unknown to us, we believe that spending for Soviet space programs will continue through 1975 at—or slightly below—the 1971-1973 level. Thereafter the Soviets can support an active and vigorous space effort, and introduce several new programs each year, without exceeding the current levels of expenditures. Only if the Soviets contemplate very expensive new programs—such as a manned Mars landing—would economic considerations be likely to play a decisive role. But such programs are unlikely in 1970s, primarily for technical reasons.

60. On the other hand, Soviet space programs almost certainly will not suffer significant long-term cuts in funding. The Soviets have a deep, wide-ranging commitment to the exploration and use of space. Soviet leaders—from Secretary Brezhnev to Academy of Sciences President Keldysh—have repeatedly stressed the importance of space from both an economic and a scientific standpoint. The long-term nature of the commitment is evident from the broad nature of the applications programs—both economic and military—and from the high priority accorded space research facilities. And space activities are consistently among those major accomplishments which the Soviets like to recite on state occasions as demonstrative of socialist success. In sum, the Soviets have ideological, national, and strategic commitments to space activity that transcend the economic and scientific rationales they often cite. Consequently, it is likely that the total effort—military and civilian—will continue at about the current levels.

61. The space industry has lost some of its favored position vis-à-vis other claimants in the economy who are now in closer competition for budget allocations. The growth in the space programs that each year took a large share of the technical resources of the USSR will not take as large a share in the future. Some of the incremental resources previously devoted to the space programs each year, during their period of rapid growth, can increasingly be used elsewhere in the economy.

CENTRAL INTELLIGENCE AGENCY

DISSEMINATION NOTICE

1. This document was disseminated by the Central Intelligence Agency. This copy is for the information and use of the recipient and of persons under his jurisdiction on a need-to-know basis. Additional essential dissemination may be authorized by the following officials within their respective departments:

a. Director of Intelligence and Research, for the Department of State
b. Director, Defense Intelligence Agency, for the Office of the Secretary of Defense and the organization of the Joint Chiefs of Staff
c. Assistant Chief of Staff for Intelligence, Department of the Army, for the Department of the Army
d. Director of Naval Intelligence, for the Department of the Navy
e. Assistant Chief of Staff, Intelligence, USAF, for the Department of the Air Force
f. Assistant General Manager for National Security, for the Atomic Energy Commission
g. Assistant Director, FBI, for the Federal Bureau of Investigation
h. Director of NSA, for the National Security Agency
i. Special Assistant to the Secretary of the Treasury, for the Department of the Treasury
j. Deputy for National Intelligence Officers, CIA, for any other Department or Agency

2. This document may be retained, or destroyed by burning in accordance with applicable security regulations, or returned to the Central Intelligence Agency by arrangement with the Deputy for National Intelligence Officers, CIA.

3. When this document is disseminated overseas, the overseas recipients may retain it for a period not in excess of one year. At the end of this period, the document should either be destroyed, returned to the forwarding agency, or permission should be requested of the forwarding agency to retain it in accordance with IAC-D-69/2, 22 June 1953.

4. The title of this document when used separately from the text should be classified: ~~CONFIDENTIAL~~